Read Section 6.6 and pages 53-54 on Lagrange interpolation, then answer the following.

1. Let $f_i$ be the Lagrange polynomials in $P_n(\mathbb{R})$ corresponding to some distinct scalars $c_0, c_1, \ldots, c_n \in \mathbb{R}$. Let $g \in P_n(\mathbb{R})$ be defined to be $g = \sum_{i=0}^{n} b_i f_i$ for some (not necessarily distinct) scalars $b_0, b_1, \ldots, b_n$. What is the value of the $g(c_j)$?

2. Let $T: V \to V$ be a linear operator on a finite-dimensional inner product space $V$.
   (a) Show that if $T$ is an orthogonal projection then $\|T(v)\| \leq \|v\|$ for all $v \in V$. You may want to type something like norm(v) for $\|v\|$. (Hint: use the triangle inequality).
   (b) Give an example of a projection for which this inequality does not hold.
   (c) What can you say about $T$ if the inequality is actually an equality for all $v \in V$?